SANDIA NATIONAL LABORATORIES
Albuquerque, New Mexico 87185

WIPP Procedure No. 356
Revision No. 2
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Effective Date ~~9-29-95~~ 11-17-95 CNS 11-17-95

TITLE: **ULTRASONIC DATA ACQUISITION SYSTEM**

Prepared by: Ron Parsons Date: 9/25/95

SNL Reviewer: Wesley DeYonge Date: 9/27/95

SNL Approval: Jack L. [signature] for R. Jones [signature] 9-27-95 Date: 9/25/95

SNL Safety Approval: [signature] Date: 9/25/95

MOC Cognizant Department Manager Concurrence: [signature] Date: 9-28-95

MOC Manager of Industrial Safety: [signature] for J.D. Date: 9/28/95

SNL QA Approval: [signature] Date: 9/29/95

<u>PURPOSE:</u> To provide the steps necessary for the proper operation of the AIS Ultrasonic DAS system and to provide a method of documenting the flow of the data collected and submitted to the SNL records system.

<u>RESPONSIBILITY:</u> It is the responsibility of the persons involved in the operation of the Ultrasonic DAS system to insure that:

- The calibration of the Nicolet scope is current.
- Any data gathered is collected according to this procedure.
- The media containing the data is safeguarded, documented and transported as outlined in this procedure.
- They are familiar with the DOS commands; FORMAT, DISKCOPY, DATE, TIME, and SCANDISK.

<u>SAFETY:</u> All work will be done in accordance with the WIPP Safety Manual and any applicable Safe Operating Procedure (SOP's). Other safety requirements may be specified in a Safe Work Permit. The following safety concerns will also apply:

I. Access to the underground will be in accordance with existing WIPP Site policies.

II. Ground control in the work area will be performed prior to the start of work.

<u>REFERENCES:</u> (latest revision)

I. SNL WIPP Procedure 263, Sample Tracking System

II. Test Plan, Air Intake Shaft Performance Tests

FORMS: (latest revision)

I. SNL WIPP Form 194, Ultrasonic Cartridge Disk Log

II. SNL WIPP Form 241, Transport Tape Tracking Data

QA RECORDS:

I. SNL WIPP Form 194, Ultrasonic Cartridge Disk Log

II. SNL WIPP Form 241, Transport Tape Tracking Data

III. Bernoulli Cartridge (when cartridge is full as per Step III.2.a.)

MATERIALS NEEDED:

I. BERNOULLI BOX II - 44 Megabyte 5 1/4 inch high capacity disk cartridges

II. 5 1/4 inch head cleaning cartridge for BERNOULLI BOX II 44 drives

PROCEDURE:

I. POWER UP AND SYSTEM CHECKS

A. ELGAR A.C. LINE CONDITIONER

1. Power switch up to ON.

NOTE: If Elgar A.C. Line Conditioner has been off, allow time to make sure that the conditioner is allowed to stabilize for five minutes before proceeding.

2. Green power light ON.

3. Red overload light OFF.

4. Verify a stable voltage of 110-120 volts.

B. A.C. POWER STRIPS (switches are next to the computer monitor)

1. Power switches ON.

2. Power lights ON.

C. GANDALF LDS 120

1. Number 1 (level 0), Number 2 (level 2), Number 3 (level 4).

   a. Red power lights ON.

D. HP214B PULSE GENERATOR

1. LINE LIGHT on.

E. GILTRONIX

1. Power light ON.

F. VIDEO MONITOR

1. Screen ON.

G. NICOLET SCOPE.

1. Live green storage control light ON.

H. COMPUTER

1. Power light ON.

2. Turbo light ON.

I. HP6271B D.C. POWER SUPPLY

1. Power light ON.

2. Verify/adjust voltage to 15 volts ±1 volt.

NOTE: If "DCD" lights on the Gandalf Modems do not come ON in the following steps, notify SNL Cognizant Engineer before proceeding.

J. LEVEL POWER CONTROL BOX

1. Power light ON.

2. Level 0, 2, and 4 power switches ON.

   a. Power lights ON.

   b. A.C. POWER box lights ON.

   c. GANDALF LDS 120 "DCD" lights ON.

II. MAKING A DATA RUN

A. DAS INSTRUMENTATION PRE-CHECK/SETUP

1. HP214B PULSE GENERATOR

a. MODE switch to EXT TRIG.

b. SLOPE switch to POS.

c. PULSE switch to DELAY.

d. POLARITY switch to POS.

e. PERIOD(s) switch to 1μ - 10μ.

(1) Vernier to 10.

f. PULSE POSITION(s) to .1m - 1m.

(1) Vernier to 2.

g. WIDTH(s) to 1m - 10m.

(1) DUTY CYCLE (%) switch OUT.

(2) Vernier to 3.

h. AMPLITUDE(V) to 30 - 100.

(1) Vernier to 10.

(2) INT LOAD switch OUT.

i. NICOLET SCOPE.

(1) F-43 PLUG IN (Right section).

(a) Not Used.

(2) 4094C PLUG IN (Center section).

(a) VERTICAL EXPANSION selector OFF.

(b) HORIZONTAL EXPANSION selector OFF.

(c) AUTOCENTER switch OFF.

(d) X/Y - X/T switch Y/T.

(e) MEMORY selector to ALL.

(f) FUNCTION selector TO ERASE.

(3) 4562 DUAL PLUG IN.

(a) TIME PER POINT to .5.

(b) AVERAGE to UP.

(c) POINT AVERAGE to UP.

(4) CHANNEL A setup.

(a) FILTER switch to OFF.

(b) ± VOLTS FULL SCALE switch to 40V.

(c) SIGNAL input (+) switch to DC.

(d) SIGNAL input (-) to GND.

(e) CHANNEL A switch to ON.

(f) SAVE REF switch to OFF.

(5) CHANNEL B setup.

(a) FILTER switch to OFF.

(b) ± VOLTS FULL SCALE switch to 100mV.

(c) SIGNAL input (+) switch to DC.

(d) SIGNAL input (-) to GND.

(e) CHANNEL B switch to ON.

(f) SAVE REF switch to OFF.

j. TRIGGER.

(1) COUPLING switches.

(a) To AC.

(b) To NORM.

(2) SLOPE switch to +.

(3) SOURCE to EXT.

2. SET NICOLET TRIGGER POSITION

a. On the STORAGE CONTROL section of the 4562 PLUG IN press and hold, HOLD NEXT switch and press the HOLD LAST switch then release both (releasing the HOLD LAST switch first).

(1) When the STORAGE CONTROL section is properly set, the HOLD LAST, LIVE and HOLD NEXT lights will be ON. Reset the STORAGE CONTROL section if needed to achieve the proper indication.

b. Verify on the 4094C PLUG IN display that you are viewing the CHANNEL A settings (1AS at bottom center of screen). If not, toggle the horizontal CURSOR on the 4094C PLUG IN to display 1AS.

c. On 4562 PLUG IN press TRIG POSITION, DELAY, and ZERO switch.

d. On 4562 PLUG IN move TRIG POSITION A toggle switch and read the time delay on the bottom of screen on 4094C PLUG IN, set the time delay to -500.0 sec.

e. On the 4094C PLUG IN toggle the right horizontal CURSOR on the 4094C PLUG IN to set the CHANNEL B settings. (1BS will be displayed at the bottom center of screen.)

f. On 4562 PLUG IN move TRIG POSITION B toggle switch and read the time delay on the bottom of screen on 4094C PLUG IN, set the time delay to -500.0 sec.

3. COMPUTER SETUP

NOTE: This section assumes that the computer has just been BOOTED UP. If computer is not displaying the message in the following step 3.a.(1), reboot the computer before performing the following steps.
Words enclosed in angle brackets mean press the key whose label is in the brackets. For example, **<ENTER>** means press the Enter key on the keyboard.

a. Check the System Time and Date

(1) The first message on the screen will be:

C:\>date
Current date is Thur 02-23-1995
Enter new date (MM-DD-YY):

(a) Enter correct date or press **<ENTER>** if correct.

(2) The next message on the screen will be:

C:\>time
Current time is 00:00:00.00a
Enter new time:

(a) Enter correct time ± 1 minute or press **<ENTER>** if correct.

4. DRIVE SETUP

NOTE: This procedure assumes drive D is being used to collect data. If drive E is used, enter **E** instead of **D** where necessary.

a. Check the data disk integrity and capacity.

(1) Insert the current Bernoulli cartridge in drive D (see SNL Form 194 Disk Log for current disk number) and wait until the green light for the disk drive is ON and not blinking.

(2) At the C:\> type **SCANDISK d: /CHECKONLY <ENTER>**

(3) If any problems are reported, notify the SNL Cognizant Engineer or the PI.

(4) At the C:\> type **DIR D: <ENTER>**

(a) Make sure that there is at least 8 megabytes of space available on the disk. (If the data run requested is only a partial run, less disk space is required.)

(b) If disk space is insufficient, format a new cartridge according to Section V.B. and restart this section.

b. Complete sections 1 and 2 of SNL Form 194.

5. SETUP NICOLET DISPLAY

a. On the computer type **AIS <ENTER>**. The following should be displayed on the screen.

```
*******************************
*      Air Intake Shaft       *
*  Data Acquisition Program   *
*       Version = 1.21        *
*        WIPP Project         *
*    02-06-1995  12:10:14     *
*******************************
Current Default Data Drive = D:

*** Main Menu ***
 (0) Stop
 (1) Manual Data Run
 (2) Automatic Data Run
 (3) Store Data to Disk
 (4) Recall Data from Disk
 (5) Print Data
```

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(6) Plot Data, Auto Scaling
(7) Plot Data, Manual Scaling
(8) Diagnostic Run
(9) Create/Edit Input file
(10) Select Default Data Drive
(11) Test the Giltronix Auto-Switch
Make Selection

b. Type **8 <ENTER>** DIAGNOSTIC RUN.

(1) Wait for the computer to activate remote devices.

c. Type **4 <ENTER>** Level Select.

d. Type **D2 <ENTER>** Select transmitter.

e. Type **2 <ENTER>** Hole Select.

f. Type **D2 <ENTER>** Select receiver.

g. Type **<ENTER> <ENTER> <ENTER>**.

CAUTION: If the diagnostic run exceeds 2 minutes the 5X attenuator on the + input of the Nicolet may be come excessively hot! The diagnostic run may be run longer if the temperature of the attenuator is monitored closely (if it's too hot to hold it's too hot).

h. Use CHANNEL B POSITION switch on 4562 PLUG IN of the Nicolet to set signal on CHANNEL B on the center line of the 4094C Screen (momentarily turn off the AVERAGE function while making this setting).

i. Use CHANNEL A POSITION switch on 4562 PLUG IN of the Nicolet to offset the CHANNEL A baseline voltage signal 1/8" - 1/4" below CHANNEL B baseline signal (momentarily turn off the AVERAGE function while making this setting).

j. Press **<F1> <ENTER>** and then type **Y <ENTER>** to return to MAIN MENU.

B. TAKING DATA

NOTE: This section assumes that the computer is displaying the main menu of the AIS DAS program and the previous section has just been completed. If necessary to abort an automatic data run, press **<F2>** then type **Y <ENTER>**.

1. Verify that Default Data Drive is Drive D. (Default Data Drive is listed under the program title of the Main Menu.)

a. If the improper drive is selected, type **10 <ENTER>.** GNS 11-17-95

b. Type new drive specification **D <ENTER>.**

2. Type **2 <ENTER>** for an Automatic Data Run.

   MESSAGE DISPLAYED:
   ENTER PATH FOR INPUT FILE
   [DEFAULT = C:\QB45]

3. Type **C:\QB45\ <ENTER>.**

   MESSAGE DISPLAYED:
   Volume in drive C is AIS U/S
   Volume Serial Number is 0FCA-2B3E
   Directory of C:\QB45

```
LEVEL0          INP            1,460 10-27-92   1:59p
LEVEL02         INP            3,051 10-27-92   2:01p
LEVEL024        INP            4,565 10-27-92   2:00p
LEVEL04         INP            3,052 10-27-92   2:02p
LEVEL2          INP            1,539 10-27-92   2:00p
LEVEL24         INP            3,052 10-27-92   2:02p
LEVEL4          INP            1,539 10-27-92   2:00p
TEST4           INP               62 10-27-92   1:39p
8 file(s)          18,320 bytes
20,000,000 bytes free


Enter name of input file (no extension)
[ Default = LEVELXXX ]
?
```

4. Type **LEVEL024 <ENTER> <ENTER>** (unless another run has been requested by the Cognizant Engineer).

5. When data taking begins, enter the information from the message displayed on monitor on SNL Form 194 section 3.

   NOTE: The Automatic Data Run may be left unattended. A full data run (all 3 Levels) will take approximately 1 hour.

6. When automatic data run is completed, enter information from message displayed on monitor on SNL Form 194 sections 4 and 5.

7. Press **<ENTER>** to continue. The screen will display the Main Menu as in Section II.A.5.a.

8. Type **0 <ENTER>** to stop.

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III. POST DATA RUN BERNOULLI CARTRIDGE CARE AND STORAGE

1. At the C:\> type **SCANDISK d: /CHECKONLY <ENTER>**.

   a. If any problems are reported notify the SNL Cognizant Engineer or the PI.

2. At the C:\> type **DIR d: <ENTER>**.

   a. Make sure that there is at least 8 megabytes of space available on the disk.

      (1) If the data cartridge is full, fill out SNL Form 241 according to SNL Procedure 263, Sample Tracking System.

3. Press the cartridge release button (Blue) and wait for the green light to go out.

4. Remove the data cartridge from drive.

5. Place the data cartridge in a storage sleeve and storage case.

6. Return the data cartridge and its form(s) to the Cognizant Engineer.

IV. POST RUN SHUT DOWN

A. LEVEL POWER CONTROL BOX

1. Turn off all levels.

B. A.C. POWER STRIPS (switches next to the computer monitor)

1. Both Power switches off.

C. ELGAR A.C. LINE CONDITIONER.

CAUTION: DO NOT TURN OFF.

V. SYSTEM MAINTENANCE

A. CLEANING THE BERNOULLI DRIVE

1. Clear the disk drive that needs cleaning.

2. Using the Bernoulli Drive Cleaning Kit

   a. Moisten the cleaning pad with 10 - 11 drops of the supplied solution.

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b. Put the drive in cleaning mode by pressing and holding the disk release button until the green drive light begins to blink.

c. Place the cleaning cartridge in the drive and move the lever back and forth approximately 30 times.

d. Remove the cleaning cartridge and store until next use

B. FORMATTING BERNOULLI DISKS

1. At the C:\> type **FORMAT D: <ENTER>**

   a. At the label prompt, type the disk number as **Disk ##.** (## is the next consecutive disk number.)

2. At the C:\> type **SCANDISK D: /CHECKONLY <ENTER>.**

   a. If any problems are reported, notify the SNL Cognizant Engineer or the PI.

   b. If the Scandisk does not report any problems, the disk format is complete.

C. MAKING BERNOULLI BACKUPS

NOTE: The following section is a guideline only. Any commercial software that can copy the disk and perform a verification may be used.

1. Place the original and the new data cartridge disk in the Bernoulli drive and at the C:\> type **DISKCOPY D: E: /V** to produce a copy of the data cartridge disk.

2. At the C:\> type **SCANDISK E: /CHECKONLY <ENTER>**. If any problems are reported, notify the SNL Cognizant Engineer or the PI.

3. Make sure SNL Form 241 is completed for both disks according to SNL Procedure 263, Sample Tracking System.

4. Hand deliver both data cartridge disk and completed SNL forms 194 and 241 to the SNL Cognizant Engineer or SNL Records.

D. MAKING ZIPPED BACKUPS

NOTE: This process is best accomplished on the computer that it will be E-Mailed from, because the files from a full data run will fill more than one 3.25 inch HD disk. It is much easier to transfer files from the hard drive to the E-Mail program than from floppy's. The -& and -rp switches may be omitted when creating a zipped file on a hard drive.

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1. At the C:\> type **PKZIP -& -rp B:(MMDDY_R) (FULL PATH)*.***

   a. For **FULL PATH** enter the path statement recorded in section 3 of SNL Form 194. For example **D:\LEVEL024\010195\102509**

   b. For **MMDDY** enter the Month, Day, and Year of the data run. For example January 1, 1995 would be 01015.

   c. For **R** enter the Run number from section 1. For example enter 01 for run number 1.

   NOTE: The final command will read similar to **PKZIP -& -rp B:01015_01 D:\LEVEL024\010195\102509**

2. Change disk if requested by the program.

3. Label the disks in the following manner:

   AIS U/S test
   File name MMDDY_R.ZIP
   Disk 1 of ??

4. Create a self extracting file.

   a. At the C:\> type **ZIP2EXE B:(MMDDY_R).ZIP**.

E. TRANSPORTING DATA TO THE PI VIA E-Mail

NOTE: Since there are many E-Mail programs on the market only general instructions will be given about E-mail. The data may also be placed in a network directory that is accessible to the PI.

1. Address the E-mail to the PI. For example **INTERNET:DJHOLCO@SANDIA.GOV**.

2. For the subject type: **AIS U/S Data MM/DD/YY** of the data run.

3. For the body enter any notes or observations. (The error log is included in the ZIP file.)

4. Attach the file to the E-Mail message.

5. Send the message.

6. Confirm that the packet has been received and the file has successfully been extracted.

7. Any files that were created (.ZIP or .EXE) to transfer the data may be deleted after the PI has confirmed data received.

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REVISION SUMMARY

To be completed by procedure's author before final revision is circulated for signatures.

I. Revisions made: Rewrite For New equipment
This procedure was originally started into the signoff process in June, 1995 but was stopped ~~[illegible]~~ due to cutbacks in Funding. All SNL signers had reviewed it and the procedures lacked only WID signatures. Since the signatures were 3 Months old ~~the~~ when the budget was reinstated the pro was Rerouted.

II. Personnel effected:

(Check appropriate ones)

MOC Craftsman	
Drilling	
Shop	
Mechanical	
Electrical	
Gage	
Cable/TC	
U/G DAS	
Geotech	

SNL JOB AREA	
DAS General	✓
DAS B49 Trailer	
DAS Sheds	
DAS Equip. Cal. & Inv.	
Thermocouple	
Cables	
Drilling	
Gage Installation	
Gage Cal. & Removal	
Plugging & Sealing	
Brine Transport	
QA	
General	
Principal Investigator	
Bin Leak Tester	
Permeability Testing	

III. Retraining required:

(Circle One)

(Read)/Re-read procedure

Practical demonstration

Other (explain)

Signature of Procedure's Author [signature] Date 9/25/95

WASTE ISOLATION PILOT PLANT
Sandia National Laboratories

Rationale for Revision

Form Number: 425 **Effective: 7/31/95**

Procedure: QAP 5-1 Revision: 1 Page 1 of 1

Document No.: TOP 356 Rev. No.: 2 Effective Date: 11-14-95

Document Title: Ultrasonic Data Acquisition System

ICN Nos. That Are Incorporated: N/A

Change No.: N/A pg(s) _____ Sect/Subset Step No.(s) _____

Description: *(Briefly describe the change.)*

Permit for new equipment.

Rationale: *(Provide justification including the source causing the change, e.g., QAP changes, PAR, etc.)*

New equipment.

Change No.: _____ pg(s) _____ Sect/Subset Step No.(s) _____

Description:

Rationale:

Change No.: _____ pg(s) _____ Sect/Subset Step No.(s) _____

Description:

Rationale:

(Locate this page on the reverse side of the document cover page.)

SWCF File Code: _____

WBS# _____